Disappearance of Nitrates in Mangolds.

DURING last autumn, winter, and spring, I made a series of analyses of mangolds, determining in each case the nitrogen present as albuminoids and as nitrates.

The roots were pulled during the last week in October, and clamped in the ordinary way. Roots of the same weight—about 7 pounds—were taken for analysis on the dates shown in the table.

The albuminoid nitrogen was determined in the dry matter, by leaving two grams in contact with 4 per cent. carbolic acid, containing metaphosphoric acid, for twenty-four hours; the nitrogen determined in the insoluble portion, by Kjeldahl's method, being taken as albuminoid nitrogen.

The total nitrogen was determined by a modification of Kjeldahl's method in the dry matter.

The nitric nitrogen was determined in the juice by Schlœsing's method.

The amide and ammoniacal nitrogen was calculated from the above by difference.

The results are given in the annexed table.

Table of Results of Mangold Analyses.

Date of analysis	Total nitrogen		Albuminoid N.		Nitric nitrogen		Amide and ammon. N.	
	Per cent. in root	Per cent. of total N.	Per cent. in root	Per cent. of total N.	Per cent. in root	Per cent. of total N.	Per cent. in root	Per cent. of total N.
October 12 ..	·183	100	·055	30·0	·050	27·3	—	42·7
December 1 ..	·241	100	·113	48·4	·048	19·8	—	31·8
February 1 ...	·238	100	·075	32·1	·035	14·7	—	53·2
March 10 ...	·207	100	·061	29·3	·026	12·6	—	58·1
,, ,, ...	·204	100	·053	25·9	·028	13·5	—	60·6
April 20[1]... ..	·277	100	·047	17·3	·023	8·3	—	74·4
,, ,, ...	·250	100	062	24·8	·022	8·8	—	66·4
May 20	·233	100	·056	24·0	·022	9·4	—	66·6

[1] This root was rotten inside and hollow.

Two questions appear to me to arise from these analyses:

(1) Is the disappearance of the nitrates due to a denitrifying action of the cells, or to bacterial action?

(2) Is not this disappearance of the nitrates during storage answerable for the fact that mangolds are more suited for food after January than in the autumn?

I purpose repeating these experiments on a larger scale next winter.

T. B. WOOD.

Agricultural Department, University of Cambridge.

Globular Lightning.

THE following appears to be an instance of so-called "Globular Lightning" (NATURE, vol. xl. pp. 296, 366, 415, &c.).

During the thunderstorm of July 20, with which the drought broke up, an elderly man, Thomas Smith, residing in this parish about half a mile from the railway station, was watching the lightning from his cottage door, between 5 and 6 p.m., when he noticed a white ball, "about the size of an egg," dancing about in the air "like rooks when at play." He watched it through the intervals between two or three lightning flashes, therefore during several seconds. After some interval (perhaps a few minutes), he still standing at the door, his wife just coming down the stairs to him, something seemed to pass between them which felt hot to their faces. Simultaneously Miss Downes, schoolmistress, sitting on the landing above the stairs, felt something hot pass her hair behind, and then in a small bedroom, with open door adjoining, a loud detonation took place; whitewash from the ceiling covered bed and floor, the wall-paper was torn, the plaster fissured, and the house filled with a "sulphurous" smell.

There is a draught up the stairs, but no apparent reason why what it brought should enter the little bedroom. The cottage stands alone, on high ground, but not the highest, and there is nothing exceptional in its construction or its surroundings.

Cockfield, Suffolk, July 22. E. HILL.

"Bicycles and Tricycles."

IN reading Mr. Boys' most interesting review of Mr. Sharp's book on "Bicycles and Tricyles" (NATURE, July 8), a few points occur to me as requiring further notice.

In Chapter xi., on bending, the *strengths* of tubes of various sections are compared by considering the modulus (Z) of each section, while Mr. Boys speaks of *stiffness*, and mentions that D tubing is 1 per cent *stiffer* than round tube of the same weight and width. I venture to think that, in stating this, Mr. Boys has overlooked the fact that, since the D section is unsymmetrical about the longer axis, the ratio of its moment of inertia to that of round tube $\left(\frac{I_D}{I_0}\right)$ is much greater than the ratio of the moduli $\left(\frac{Z_D}{Z_0}\right)$.

Thus the relative stiffness of D tube $\left(\frac{\cdot 1542}{\cdot 1250} = 1\cdot 23\right)$ is much greater than its relative strength $\left(\frac{\cdot 252}{\cdot 250} = 1\cdot 008\right)$.

These values assume the D section to be semicircular, and the tubes to be infinitely thin; when the thickness is finite, the round tube must have the thicker wall, and the mean diameter becomes less than the mean radius of the semicircle, so that the ratios become greater still.

In practice the semicircular section is seldom used, a much more square-shouldered shape being preferred, which, whilst only slightly less stiff than rectangular tube of the same weight, width and perimeter, is much less unsightly in appearance. The actual advantage of D tube over round is found by experiment to be from 30 per cent. to 40 per cent.

It may be well here to draw attention to tests of various fanciful sections (webbed, corrugated, &c.), which are published from time to time, showing great apparent advantages over plain tubing. In every case the test is made by supporting the tube at the ends, and applying the load at the centre by means of the ordinary knife-edge used for testing solid bars. The result is that the tube wall is crushed in long before the real limit of bending moment is reached, and the test merely indicates resistance to local denting. To avoid this the tube should be as long as possible, and the load distributed over a large area.

Mr. Sharp's book is the first serious effort that has been made to bring the cycle-maker into line with the rest of the engineering profession. R. H. HOUSMAN.

Mason College, Birmingham.

I AM obliged to Mr. Housman for pointing out a slip of expression in my review of Mr. Sharp's book. I had not confused the ratio of the I's for the ratio of the D's, but merely inadvertently used the word "stiffness" in its colloquial and more extended sense, so to include resistance to forces which would seriously bend or damage, as well as to those which would produce infinitesimal bending.

While on the subject of strength or stiffness of thin tubes, it may be worth while to point out that the complete theory of bending, as applied to very thin tubes, is by no means included in the usual formulæ; and it is for this reason that properly designed experiment is essential in extreme cases.

C. V. BOYS.

"A Text-book of Histology."

MY attention has been drawn to a review of my work on histology, which appeared in your issue of May 20; and as the review appears to me to be biassed, and amounts in fact to a public attack on me as an histologist, I trust you will, in fairness, give me the opportunity of as publicly defending myself, by inserting this letter in your next number.

Not one of the charges brought against the book can be fairly substantiated. Your space will not admit of my traversing more than a few of the points raised, but these will serve as samples of the whole.

(1) Your reviewer refers to a well-known excellent atlas of histology, and contrasts the accuracy of the drawings with mine. I deny the justice of his comparison: to take instances, if any one will compare the drawings of the eye and cochlea in my text-book with those of the same structures in the atlas, he will speedily be convinced as to where the inaccuracy lies. If the descriptions in the atlas referred to contained much that was new at the time, I can only say that histology must have

© 1897 Nature Publishing Group

been previously in a very bad pass indeed; but, as far as I know, there is very little that was new even then, except the portion of the work dealing with the lymphatics.

(2) Your reviewer appears not to have apprehended the purpose for which the book was written, viz. to help the ordinary student. To endeavour to teach him how to trace degeneration of nerve fibres "by the invaluable method described by Marchi" is laughingly absurd to any one who has had much acquaintance with histological classes.

(3) Staining in bulk is by no means omitted, the process being carefully described in the chapter on methods, and referred to again and again in the directions for preparation of sections given in the appendices.

(4) I fear your reviewer will "look in vain" again in the second edition of the book for "the methylene-blue method of Ehrlich for showing nerve endings"; for I shall not forsake the principle I have clearly laid down, that it is useless and inadvisable to preach to students what it is impossible, or at least improbable, that they can practise. The work has no ambition to be an up-to-date histologist's *vade-mecum*.

(5) To say that I state that the process of staining with silver nitrate solution "requires from a few hours to a day or two" is to give an entirely false impression. It is distinctly stated that the tissue requires to be subjected to the reagent for from ten to twenty minutes, and then exposed to daylight "for a few hours to a day or two"—a totally different thing. This is quite sufficient, I think, to demonstrate the unfairness of this part of the review.

(6) The statement in the concluding paragraph that the book is "acknowledgedly compiled from other sources" is absolutely untrue. The usual acknowledgment of indebtedness to current literature is made, and the immediate source is given of some of the formulæ; the latter, however, being as much public property as the dates in English history.

(7) Your reviewer is inconsistent in saying at one time that the drawings are "sadly lacking in accuracy," and at another that "they will rejoice the heart of the average student, who will find them just like his specimens." To say that a student would rejoice over a "gaudy" coloured, uninstructive drawing, lacking in accuracy, and having only a superficial resemblance to his specimen, is not only insulting to his intelligence, but is childish in the extreme.

In conclusion: your reviewer charges the book with inaccuracy in the drawings, and also in the text. I take this to mean that both the text and the drawings, as a whole, are inaccurate, because he does not qualify his hostility by one good word from beginning to end. I deny that he can substantiate his charge. I challenge him to do so as publicly as he has made it.

I am glad to say that your review in its unfavourableness stands alone. The rest of the press, both lay and scientific, has spoken well of the work, and I am sure the editor of NATURE will not be under the impression that that valuable paper is the only one enjoying the services of experts for scientific reviews.

ARTHUR CLARKSON.

Marischal College, Aberdeen, June 29.

IN reply to the above, I beg to assure Dr. Clarkson that the bias of which he complains is solely the result of a critical examination of his book. I have no personal knowledge of him, nor any previous reason for thinking ill of him. I will take his paragraphs in succession:—

(1) Comparison with Klein and Noble Smith's "Atlas of Histology." Dr. Clarkson's temerity in endeavouring to put his book on a par with this classical work, which teems with original observations, and the illustrations to which are drawn with the most minute attention to detail, will raise a smile on the lips of every histologist. He is particularly unfortunate in calling attention to his illustrations of the eye and cochlea, which are vastly inferior to those in the "Atlas," although in the sixteen years since that work was published there has been an enormous advance in our knowledge of the structure of these parts, and notably of the retina. I fail to find a sign of this advance either in the text or illustrations.

(2), (3), (4) That the book is intended for the "ordinary student" (I presume that by ordinary student "medical student" is intended), and does not, therefore, require (to use the author's own language) to be "up to date." Dr. Clarkson seems to be under the impression that there is a special kind of scientific knowledge desirable for medical students, and that it is therefore unfair to have judged his book by a rigid scientific standard. I, on the other hand, hold that a book which is sent to a scientific journal for review must be judged on its scientific merits, and must stand or fall upon these. And if I find two of the most valuable modern methods of investigating the structure of the nervous system omitted, and venture to point out their omission, Dr. Clarkson does not, in my judgment, improve his position by the statement that he has purposely committed this blunder, and that it is his intention to perpetuate it.

There may be a "careful description of the process of staining in bulk," but I have failed to find it. There is no mention of Heidenhain's method, which is largely used in all laboratories.

(5) Dr. Clarkson convicts himself, in having misapprehended my criticism. It is precisely the statement that after silver nitrate a tissue "requires from a few hours to a day or two" exposure in water to daylight that I animadverted upon. Every histologist knows, or should know, the detrimental effect of prolonged exposure to light of such preparations.

(6) It is a sufficient answer to this to give Dr. Clarkson's own words. He says in the preface: "The author would acknowledge his indebtedness generally to the current standard works on the subject; and especially to Prof. Stirling's 'Outlines of Histology' for many of the formulæ of reagents." To this I would, however, add that many points besides the formulæ of reagents have a singular resemblance to corresponding points in Stirling, to say nothing of the other "current standard works" to which no name is appended; and, on the other hand, if there is anything original either in the way of descriptions or methods, I at least have been unable to find it.

(7) I have not made merely a general and unsupported accusation of inaccuracy, but I have given specific instances, which might easily be multiplied were it worth the space they would occupy. Since Dr. Clarkson has in his letter made no attempt to explain these, I take it that he admits their justice, and his public challenge becomes a vain piece of bombast.

Finally, I would add that the fact that the rest of the press has spoken favourably of Dr. Clarkson's work is simply an indication that notices of such books are far too frequently drawn up in a careless and perfunctory manner. The injurious effect which such promiscuous eulogy may have upon an author is only too evident from the tone of Dr. Clarkson's letter.

THE REVIEWER.

A Phenomenal Rainbow.

A VERY beautiful rainbow was observed here on the evening of May 26 last, just before sunset. A light easterly air prevailed at the time; but the thin bank of stratus cloud upon which the bow was projected had drifted slowly across from the south-west, and now hung in the eastern sky. The sun was quite low at the time, and during the last two or three minutes before setting was shining through a thin layer of stratus which lay just above the horizon; but there was no apparent diminution in the startling vividness of colour exhibited in the arch. This extraordinary brightness, however, was not the only noticeable feature; immediately below the great arch, and contiguous to it and to each other, were four narrow arches, in which the vivid colours were repeated; these did not reach the horizon, but faded when about three parts of the way down. There was also, some distance above the main arch, a secondary bow, with the four narrow arches appearing again; but here, instead of being below, they were directly above the arch, and, of course, not so bright as the primary set. The whole appearance was curiously like some of the solar phenomena observed in the Arctic sky, and was so beautiful as to attract the attention of several working bushmen, who are not prone to fall into ecstacies over any natural wonders.

The appearance lasted about five minutes, until the sun was below the horizon; a light shower fell at the time. For some days previously the weather had been thundery and unsettled, with variable winds.

H. STUART DOVE.

Table Cape, Tasmania, June 1.

Fire-fly Light.

IN reply to Prof. S. P. Thompson (p. 126), the insect called in German *Johanniskäfer* or *Johanniswürmchen* is certainly the *Lampyris noctiluca* (glow-worm), of which only the female which has no wings, is luminous.

© 1897 Nature Publishing Group